Claims

1. A stent for use in a patient, comprising:

(a) a first segment locatable on the proximal side of the external sphincter and including an external surface, an internal surface, a proximal portion, a distal end, and a lumen defined by the internal surface and extending within the first segment, the proximal portion including at least one opening in communication with the lumen for receiving fluid from the bladder of the patient, the distal end terminating on the proximal side of the external sphincter when the stent is placed within the body of the patient;

(b) a second segment locatable on the distal side of the external sphincter of the patient and including an external surface, an internal surface, a proximal end, a distal end, and a lumen defined by the internal surface and extending within the second segment, the proximal end terminating on the distal side of the external sphincter when the stent is placed within the body of the patient;

(c) a connecting segment disposed between the first and second segments and coupling together the first and second segments; and

(d) an agent on the external surface of the first segment.

2. The stent according to claim 1 wherein the agent comprises a hemostatic agent selected from the group consisting of, but not limited to collagen, thrombin, fibrin, alginate, a hydrogel, and combinations thereof.

3. The stent according to claim 1 wherein the hemostatic agent is also on the external surface of the second segment.

4. The stent according to claim 1 further comprising an anticoagulant on each of the internal surfaces of the first and second segments.

5. The stent according to claim 4 wherein the anticoagulant is selected from the group consisting of, but not limited to acenocoumarol, ancrod, anisindione, bromindione, clorindione, coumetarol, cyclocumarol, dextran sulfate sodium, dicumarol, diphenadione,

ethyl biscoumacetate, ethylidene dicoumarol, fluindione, heparin, hirudin, lyapolate sodium, oxazidione, pentosan polysulfate, phenindione, phenprocoumon, phosvitin, picotamide, tioclomarol and warfarin.

6. A method of positioning a stent within the urinary system of a patient, comprising:

(a) providing a stent comprising:

a first segment locatable on the proximal side of the external sphincter and including an external surface, an internal surface, a proximal portion, a distal end, and a lumen defined by the internal surface and extending within the first segment, the proximal portion including at least one opening in communication with the lumen for receiving fluid from the bladder of the patient, the distal end terminating on the proximal side of the external sphincter when the stent is placed within the body of the patient;

a second segment locatable on the distal side of the external sphincter of the patient and including an external surface, an internal surface, a proximal end, a distal end, and a lumen defined by the internal surface and extending within the second segment, the proximal end terminating on the distal side of the external sphincter when the stent is placed within the body of the patient;

a connecting segment disposed between the first and second segments and coupling together the first and second segments; and

an agent on the external surface of the first segment;

(b) providing a stylet for pushing the stent through the patient's urethra, the stylet comprising a proximal end and a distal end, and sized to be received within the lumens of the second and first segments;

(c) passing the stylet through the lumens of the second and the first segments of the stent;

(d) inserting the stent and stylet into the patient's urethra;

(e) positioning the stent within the patient's urinary system such that the first segment is located substantially within the prostatic urethra with the distal end of the first segment terminating prior to the proximal side of the external sphincter, the second segment located on the distal side of the external sphincter, and the connecting segment extending through the external sphincter; and

(f) removing the stylet completely from the lumens of the first and second segments and from the patient's urethra, thereby leaving the stent positioned within the patient's urinary system.

7. A stent for use in a patient comprising:

(a) a first segment locatable on the proximal side of the external sphincter and including an external surface, an internal surface, a proximal portion, a distal end, a lumen defined by the internal surface and extending within the first segment, and a plurality of openings for conveying at least one agent to the external surface, the proximal portion including at least one opening in communication with the lumen for receiving fluid from the bladder of the patient, the distal end terminating on the proximal side of the external sphincter when the stent is placed within the body of the patient;

(b) a second segment locatable on the distal side of the external sphincter of the patient and including an external surface, an internal surface, a proximal end, a distal end, and a lumen defined by the internal surface and extending within the second segment, the proximal end terminating on the distal side of the external sphincter when the stent is placed within the body of the patient; and

(c) a connecting segment disposed between the first and second segments and coupling together the first and second segments.

8. The stent according to claim 7 wherein the second segment further includes a plurality of openings for conveying the at least one agent to the external surface of the second segment.

9. The stent according to claim 7 further comprising an anticoagulant on each of the internal surfaces of the first and second segments.

10. The stent according to claim 9 wherein the anticoagulant is selected from the group consisting of, but not limited to acenocoumarol, ancrod, anisindione, bromindione, clorindione, coumetarol, cyclocumarol, dextran sulfate sodium, dicumarol, diphenadione, ethyl biscoumacetate, ethylidene dicoumarol, fluindione, heparin, hirudin, lyapolate sodium, oxazidione, pentosan polysulfate, phenindione, phenprocoumon, phosvitin, picotamide, tioclomarol and warfarin.

11. The stent according to claim 7 further comprising a polymerizable agent on the external surface of the first segment.

12. The stent according to claim 11 wherein the polymerizable agent is a polymerizable hemostatic agent selected from the group consisting of, but not limited to fibrinogen, alginate, and collagen.

13. The stent according to claim 11 further comprising the polymerizable hemostatic agent on the external surface of the second segment, and wherein the second segment further includes a plurality of openings for conveying at least one agent to the external surface of the second segment.

14. The stent according to claim 11 further comprising an anticoagulant on the internal surfaces of the first and second segments.

15. The stent according to claim 14 wherein the anticoagulant is selected from the group consisting of, but not limited to acenocoumarol, ancrod, anisindione, bromindione, clorindione, coumetarol, cyclocumarol, dextran sulfate sodium, dicumarol, diphenadione, ethyl biscoumacetate, ethylidene dicoumarol, fluindione, heparin, hirudin, lyapolate sodium, oxazidione, pentosan polysulfate, phenindione, phenprocoumon, phosvitin, picotamide, tioclomarol and warfarin.

16. A method of positioning a stent within a patient, comprising:

(a) providing a stent comprising:

a first segment locatable on the proximal side of the external sphincter and including an external surface, an internal surface, a proximal portion, a distal end, a lumen defined by the internal surface and extending within the first segment , and a plurality of openings for conveying at least one agent to the external surface, the proximal portion including at least one opening in communication with the lumen for receiving fluid from the bladder of the patient, the distal end terminating on the proximal side of the external sphincter when the stent is placed within the body of the patient;

a second segment locatable on the distal side of the external sphincter of the patient and including an external surface, an internal surface, a proximal end, a distal end, and a lumen defined by the internal surface and extending within the second segment, the proximal end terminating on the distal side of the external sphincter when the stent is placed within the body of the patient; and

a connecting segment disposed between the first and second segments and coupling together the first and second segments;

(b) providing a delivery system comprising:

a stylet for pushing the stent through the patient's urethra and sized to be received within the lumens of the second and first segments, the stylet comprising a proximal end, a distal end, a first fluid channel, a second fluid channel, a third fluid mixing channel, and a plurality of openings in communication with the third fluid mixing channel, the first and second fluid channels extending between the distal end of the stylet and the third fluid mixing channel;

a first loading cell containing a polymerizing agent;

a second loading cell containing a polymerizable hemostatic agent;

a first delivery mechanism used for injecting the polymerizing agent into the first fluid channel of the stylet; and

a second delivery mechanism used for injecting the polymerizable hemostatic agent into the second fluid channel of the stylet;

(c) passing the stylet through the lumens of the second and the first segments of the stent;

(d) aligning the plurality of openings in the stylet with the plurality of openings in the stent;

(e) inserting the stent and stylet with aligned openings into the patient's urethra;

(f) positioning the stent within the patient's urinary system such that the first segment is located substantially within the prostatic urethra with the distal end of the first segment terminating prior to the proximal side of the external sphincter, the second segment located on the distal side of the external sphincter, and the connecting segment extending through the external sphincter;

(g) activating the first and second delivery mechanism substantially simultaneously such that the polymerizing agent is injected into the first fluid channel and is conveyed to the third fluid mixing channel, and the polymerizable hemostatic agent is injected into the second fluid channel and is conveyed to the third fluid mixing channel;

(h) allowing the polymerizing agent and the polymerizable hemostatic agent to mix within the third fluid mixing channel, thereby forming a polymerized hemostatic agent;

(i) providing the external surface of the stent with the polymerized hemostatic agent by allowing the polymerized hemostatic agent to flow through the aligned plurality of openings in the stylet and stent; and

(j) removing the stylet completely from the lumens of the first and second segments and from the patient's urethra, thereby leaving the stent coated with the polymerized hemostatic agent positioned within the patient's urinary system.

17. A method of positioning a stent within a patient, comprising:

(a) providing a stent comprising:

a first segment locatable on the proximal side of the external sphincter and including an external surface, an internal surface, a proximal portion, a distal end, a lumen defined by the internal surface and extending within the first segment, and a plurality of openings for conveying at least one agent from the lumen to the external surface, the proximal portion including at least one opening in communication with the lumen for receiving fluid from the bladder of the patient,

the distal end terminating on the proximal side of the external sphincter when the stent is placed within the body of the patient;

a second segment locatable on the distal side of the external sphincter of the patient and including an external surface, an internal surface, a proximal end, a distal end, and a lumen defined by the internal surface and extending within the second segment, the proximal end terminating on the distal side of the external sphincter when the stent is placed within the body of the patient;

a connecting segment disposed between the first and second segments and coupling together the first and second segments; and

a polymerizable hemostatic agent on the external surface of the first segment;

(b) providing a delivery system comprising:

a stylet for pushing the stent through the patient's urethra and sized to be received within the lumens of the second and first segments, the stylet comprising a proximal end, a distal end, a lumen extending between the proximal end to the distal end, and a plurality of openings in communication with the lumen;

a loading cell containing a polymerizing agent; and

a delivery mechanism used for injecting the polymerizing agent into the lumen of the stylet.

(c) passing the stylet through the lumens of the second and the first segments of the stent;

(d) aligning the plurality of openings in the stylet with the plurality of openings in the stent;

(e) inserting the stent and stylet with aligned openings into the patient's urethra;

(f) positioning the stent within the patient's urinary system such that the first segment is located substantially within the prostatic urethra with the distal end of the first segment terminating prior to the proximal side of the external sphincter, the second segment located on the distal side of the external sphincter, and the connecting segment extending through the external sphincter;

(g) activating the delivery mechanism such that the polymerizing agent is injected into the lumen of the stylet and is released to the stent through the aligned plurality of

openings in the stylet and stent, thereby polymerizing the polymerizable hemostatic agent on the external surface of the first segment to form a polymerized hemostatic agent on the external surface; and

(h) removing the stylet completely from the lumens of the first and second segments and from the patient's urethra, thereby leaving the stent with the polymerized hemostatic agent positioned within the patient's urinary system.